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14. ABSTRACT Purpose: This study tested the effectiveness of a dynamic educational and mentoring program, facilitated by unit-level mentors, to introduce, promote, and sustain an EBP culture among nurses in a military healthcare setting. Background: The need to identify gaps in practice, apply principles of evidence-based practice (EBP), and advance scientific applications in the pursuit of quality nursing care is as important to military healthcare as it is in the civilian sector. Description: The Advancing Research through Close Collaboration Model guided the intervention and study. Three instruments were used: The Organizational Readiness for System-wide Integration of Evidence-based Practice (ORSIEP); EBP Beliefs (EBPB); and EBP Implementation (EBPI) scales. The study took place in three military hospitals simultaneously undergoing facility and staff integration. Data were collected from staff nurses in the inpatient nursing units before and after a facilitated education and mentoring intervention. Outcome: 360 (38%) nurses completed baseline; and 325 (31%) completed follow-up surveys. Scores improved on all three measures following implementation of the program; however, the differences were statistically significant only for the ORSIEP scale (70.96 vs. 77.63, $t = -3.95$, $p < .01$). In the paired individual pre/post-test sub-sample ($N=56$), scores improved significantly on all three instruments. Conclusions: Despite typically high turnover rates of military personnel and restructuring of three facilities during the study period, the readiness for, beliefs about, and implementation of EBP improved. This study suggests that a commitment to an EBP culture may diffuse among individuals in an organization, even while experiencing significant change. It also demonstrates that a unit-level mentored EBP program is sustainable despite changes in organizational structure and workforce composition. Implication for Military Nursing: Further studies among military nurses, using the same intervention and instruments, may show that commonly perceived systemic organizational barriers do not adversely affect – and may even raise – commitments to EBP organizational culture, readiness, beliefs, and implementation.					
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**Building a Unit-Level Mentored Program to Sustain a Culture of Inquiry for
Evidence-Based Practice**

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Abstract

Purpose: This study tested the effectiveness of a dynamic educational and mentoring program, facilitated by unit-level mentors, to introduce, promote, and sustain an EBP culture among nurses in a military healthcare setting.

Background: The need to identify gaps in practice, apply principles of evidence-based practice (EBP), and advance scientific applications in the pursuit of quality nursing care is as important to military healthcare as it is in the civilian sector.

Description: The Advancing Research through Close Collaboration Model guided the intervention and study. Three instruments were used: The Organizational Readiness for System-wide Integration of Evidence-based Practice (ORSIEP); EBP Beliefs (EBPB); and EBP Implementation (EBPI) scales. The study took place in three military hospitals simultaneously undergoing facility and staff integration. Data were collected from staff nurses in the inpatient nursing units before and after a facilitated education and mentoring intervention.

Outcome: 360 (38%) nurses completed baseline; and 325 (31%) completed follow-up surveys. Scores improved on all three measures following implementation of the program; however, the differences were statistically significant only for the ORSIEP scale (70.96 vs. 77.63, $t = -3.95$, $p < .01$). In the paired individual pre/post-test sub-sample ($N=56$), scores improved significantly on all three instruments.

Conclusions: Despite typically high turnover rates of military personnel and restructuring of three facilities during the study period, the readiness for, beliefs about, and implementation of EBP improved. This study suggests that a commitment to an EBP culture may diffuse among individuals in an organization, even while experiencing significant change. It also demonstrates that a unit-level mentored EBP program is sustainable despite changes in organizational structure and workforce composition.

Key Words

Evidence-based practice, culture, mentor, organizational change

Disclaimer

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INTRODUCTION

The Institute of Medicine's (IOM) report, *To Err is Human: Building a Safer Health System* sharpened our nation's focus on the need to radically improve patient safety in current healthcare systems. *Crossing the Quality Chasm* outlined a roadmap for improving outcomes in the American healthcare delivery system.^{1,2} In order to enhance patient safety and narrow the research-practice gap, the IOM set a goal that by 2020, 90% of clinical decisions will be based on evidence.¹ This goal challenged clinicians to provide care supported by accurate, timely, and current clinical information, reflecting best available evidence for practice. More recently, the IOM has identified the urgent need for all healthcare stakeholders to commit to continuous learning and improvement in care delivery by embracing technology, collaborating across fields of expertise, and seeking the most current evidence.³ Evidence-based practice (EBP) is a problem-solving approach and a foundation for excellence in practice that drives better outcomes for nurses and other members of the health care team as well as their patients.^{4,5} It is described as the integration of provider experience with the best external evidence, and takes into consideration patient preferences.^{6,7} The use of EBP in nursing is a long-term dynamic process which requires devoted human and material resources, and leadership support.⁸ When implemented effectively, this process includes systematic, easy-to-use methods to promote and foster scholarship, resources to enhance evaluation of evidence and implement projects, and continued follow-up to assist nurses to integrating expertise into daily practice.⁸⁻¹¹ Yet to build sustain EBP, individually held beliefs and systemic organizational barriers are common across many healthcare organizations must be overcome.^{12,13}

In a complex and often chaotic healthcare system, nurses serve as the final safety net keeping patients from harm; yet nursing remains a traditions-based profession, rather than an evidence-based one.¹⁴ Some assert that the nursing profession is a culture unto itself, full of rituals in practice.¹⁵ This traditional culture is longstanding, and is promulgated from generation to

generation by nurses' preferences in sustained practice. Regardless of educational preparation, newly licensed nurses tend to emulate their preceptors' practice patterns. In a tradition-based rather than an evidence-based culture, nurses tend to follow outdated policies and procedures without questioning their relevance or the evidence behind them. They continue to practice what they originally were taught, as opposed to integrating current research and evidence into their day-to-day practice.

Fineout-Overholt and colleagues suggest that workplace culture may be a barrier to EBP as it contributes to inconsistent use of evidence among staff nurses.¹⁶ Melnyk et al. proposed a robust "culture of inquiry" as a precursor to the routine use of evidence in daily nursing practice.⁹ A culture of inquiry is one with "an ongoing curiosity about the best evidence to guide clinical decision making" that provides the platform for establishing and supporting EBP.^{9(p49)} Nurses who are supported in a culture of inquiry are empowered to routinely ask questions and seek answers about best care delivery. In addition, they have the educational and practice resources available to provide EBP.

Inspiring cultural change has been recognized as the key component of propelling EBP to the bedside; however, organizational change is often slow and can be considered a barrier to embracing EBP.^{16,17} Breaking this traditional paradigm and implementing an evidence-based nursing culture takes encouragement and support at all levels and in particular from leadership. In turn, nursing beliefs which are frequently cited to avoid EBP such as regarding not enough time and resources can be influenced.¹⁸

While the relationship between culture and the use of evidence is rather intuitive, associations between education, knowledge and EBP do not seem to follow common assumptions. A landmark study found that physician knowledge of current practice was strongly negatively correlated ($r=-.54$, $p<.001$) with years since graduation.¹⁹ This implies that rather than increasing knowledge as experience is gained, physician knowledge in this study decreased. Estabrooks

paralleled this finding, positing that nurses rely on what they learned in nursing school.²⁰

Considering that approximately 70% of practicing nurses graduated before 1990, when there was less focus in nursing education on using research, this evidence-to-practice gap has continued to widen.^{11,21} More recently, Pravikoff and colleagues reported that among a sample of 1097 registered nurses across the United States, more than half reported they were not familiar with the term EBP, nor did they believe their colleagues used evidence in practice. In that study, only 27% of participants indicated that they had been taught how to use electronic databases and most did not use them to search for evidence.²¹ This tradition-based paradigm, combined with an older and aging workforce, a lengthening time since formal education, and the ever-increasing amount and accessibility of evidence, combine to make a complex situation in which some nurses may be resistant to change and the daily practical use of evidence, despite its breadth and availability.

Nurses and organizations must be prepared and readied for EBP before they can be expected to implement and sustain it. Being able to access and find evidence is fundamental to using it. Although there has been a rapid emergence of accessible Internet-based resources such as MEDLINE, OVID, PubMed and other electronic databases, evidence suggests that many bedside nurses' deficiencies in computer literacy skills may be preventing them from accessing and using electronic resources.²¹ At the same time, remaining up-to-date has become an insurmountable task; clinicians cannot hope to keep up with the rapidly expanding base of literature. The number of articles in biomedical and clinical research fields has more than tripled since 1970, rising from more than 200,000 a year in 1970 to more than 750,000 in 2010.²² Further, nurses tend to read professional journals that are not research-focused.²¹ In order to stay relevant in practice, nurses in the beginning of the 21st Century would have to have read and critically reviewed 19 articles a day, 365 days per year.⁷

In healthcare organizations there are barriers to EBP, as well as facilitators that contribute to its promotion and use. Understanding both barriers and facilitators is a precursor to

successfully implementing EBP into the professional nursing practice culture. Barriers serve as obstructions to the use of evidence in daily practice; e.g., lack of time, absence of skill sets for asking questions, deficiency in accessing, searching, appraising, and incorporating evidence into decision-making.^{21,23} The workplace culture itself may represent an under-recognized yet powerful barrier to the use of evidence in practice.¹¹ Barriers also include lack of systematic ways to promote clinical scholarship, lack of systemic supports to implement changes, and lack of perceived value for research and EBP.^{9,11,24,25} Lack of supporting infrastructure, including leadership, is noted as a system-wide barrier to sustainment.^{8,26} Organizations may not have infrastructure or processes in place to support a long-term, systematic approach for developing and evaluating nursing interventions, protocols, projects, and policies that are derived from scientific evidence.¹⁰

Although these and other barriers to EBP exist, there are also factors that may enable nurses to overcome EBP barriers. EBP facilitative factors include support from mentors or champions, formal and informal education, reminders and prompts, and resource aids. Mentors have long been successful in changing nursing culture and beliefs through educating peers, and can be used in a strategy for implementing and sustaining a culture of inquiry in healthcare systems.²⁷ Nurses prefer to use knowledge gained through personal experience and interactions with co-workers or with individual patients rather than through journal articles or textbooks; thus developing unit-level mentors may be key to implementing a successful EBP culture.^{23,25} In addition, a number of other interventions that facilitate EBP adoption have been recommended in the literature; e.g., learning from others in a workshop-type setting, and using supporting tools that are easy to reference and to remember.^{25,28,29} However, educational offerings that focus on didactics instead of hands-on skills may be ineffective.¹¹

Evidence-based Nursing Practice in Military Settings

The notion of using evidence to guide military practice has existed since the inception of nursing as a profession in the early 18th century. Florence Nightingale's seminal work, *Notes on Nursing: What it is, What it is not* was based on her experiences caring for British Soldiers during the Crimean War, where she recognized through observation and statistical analysis that the majority of soldiers who died were not mortally injured by battle wounds, but died due to diseases, infections, and other non-battle-related conditions.³⁰ Furthermore, Nightingale demonstrated that informed nursing care could significantly reduce mortality among the wounded. Later, the call for research as the basis for EBP was recognized by Sir Archibald Cochrane while serving as a military surgeon in a WWII Prisoner of War camp.³¹

Modern military healthcare remains similar to that of the civilian sector in its pursuit of quality, its need to address gaps in evidence, and its desire to apply best evidence to address patient care conditions. The majority of military medical threats today continue to be non-battle-related, e.g., infectious diseases, are frequently nursing-sensitive, and are found in remote and austere environments.³² Despite the rich history of military nursing research, including the establishment of the first hospital-based nursing research unit in 1954, the uses of research and other evidence in daily clinical practice have not been widely adopted by nursing staff in military facilities.^{33,34} The military nursing profession continues to be called upon to pursue and apply best evidence and technology in response to emerging and enduring threats. Yet research utilization scores in Army healthcare settings were found to be significantly lower than those in civilian settings.³⁵ These shortfalls in the use of evidence persist despite increasingly higher educational levels,³⁶ younger ages of nursing staff, and ample access to evidence-based resources among nurses who practice in a military setting.

Based upon the authors' collective experiences working in the military system, the term "evidence-based" is commonly used; however, in-depth understanding and commitment of resources to support EBP is often threatened due to rapidly shifting and competing priorities

required in a military healthcare system. Recently, a new practice model adopted by the Army Nurse Corps, the Patient CaringTouch System (PCTS), was implemented. The PCTS emphasizes the integration of EBP as foundational to providing competent care to military beneficiaries.³⁷ Although expertise in literature search techniques, critical appraisal of evidence, and recognition of key elements of the systematic review process have been identified as skills that nurses must master in order to become expert clinicians, in civilian and military nursing practice settings these may not be broadly supported, taught, or required.³⁸ Despite the strong emphasis on the necessity for EBP, only a small percentage of nurses routinely apply evidence to their clinical practice, even in civilian nursing practice.^{26,39} Less is known regarding how or whether nurses in military settings have integrated and sustained evidence into their practice.

The primary purpose of this study was to test the effectiveness of a dynamic EBP educational and mentoring program facilitated by unit-level mentors to promote and sustain EBP culture as prescribed by the Advancing Research through Close Collaboration (ARCC) Model (see Figure A).⁴⁰ The study created and evaluated a framework for sustaining the proposed culture of inquiry in military hospitals in the Washington, DC area that were involved in an unprecedented reorganization mandated by the Congressionally-legislated Department of Defense [DoD] Base Realignment and Closing [BRAC] Commission.⁴¹ A secondary aim of this study was to determine nurse perceptions of a culture of inquiry in the military hospitals before and after this system-wide reorganization.

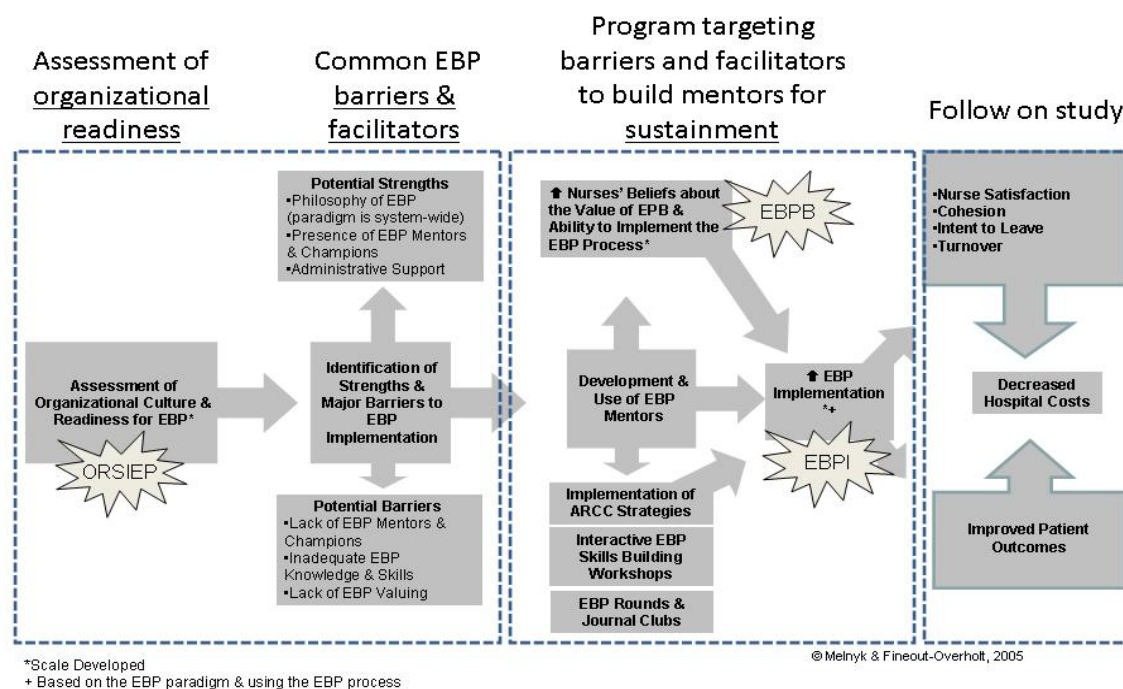


Figure A. Adapted version of the Advancing Research through Close Collaboration (ARCC) model.⁴⁴ Used with permission.

METHODS

Design

This quasi-experimental study utilized a pre-post test design to evaluate the implementation of an EBP educational and mentoring program based on an adaptation of the ARCC mentorship model.⁴⁰ The local Institutional Review Board determined the study to be an educational program, and as such, exempt from review. The ARCC model has been successfully implemented in other academic medical centers, resulting in the development of better-prepared clinicians who applied EBP principles and created an environment where changes improved practice quality, and patient and staff satisfaction.⁴² There are four core constructs in the ARCC model which are to be accomplished in the following order: 1) organizational assessment of culture and readiness; 2) identification of facilitators and barriers; 3) building mentors for sustainment; and 4) implementation of the program. The intervention tested in this study targeted all four constructs.

Setting and Sample

At the onset of the study, three separate hospitals supported military service members and other military beneficiaries, in the Washington, DC area—one Army and one Navy medical center, and one small Army community hospital. Prior to restructuring, the facilities operated as service silos, with Army personnel working only at the Army facilities and Navy personnel at the Navy facility. The reorganization of these three military medical facilities resulted in the creation of several new organizations: a single, large joint Army, Navy, and Air Force medical center system, with a 345-bed inpatient medical center; a 120-bed community hospital; and several outpatient clinics. During the course of the study the hospitals merged into one common system, with both Army and Navy nurses working at all three hospitals. The pre-test data were collected in 2010, before any unit-level mentor interventions were implemented, and prior to the institutional merger. A convenience sample of 941 registered nurses (RNs) and licensed practical nurses (LPNs) from each of the inpatient nursing units at the Army (19 units) and Navy (13 units) medical centers were invited to complete the pre-test surveys. Eighteen months later, post-test data were collected from 1053 RNs and LPNs working on 19 units at the medical center and 13 units at the community hospital.

Intervention

The study staff, which included military nurse scientists and clinical nurse specialists from the original Army and Navy facilities, employed a multi-pronged intervention. The primary intervention consisted of establishing a cadre of trained unit-level nursing mentors. Members of the cadre were identified and supported by nursing leadership to attend a two-day EBP educational workshop and to serve as EBP mentors. The workshop was led by Drs. Fineout-Overholt and Melnyk, and facilitated by study staff.

Nursing staff members from all three facilities participated in the workshop. The workshop intervention activities and content were modelled in response to recommendations in

the literature for facilitating EBP adoption; e.g., learning from others in a workshop-type setting, and using supporting tools that are easy to reference and to remember, with emphasis on experiential learning, i.e., demonstrating hands-on skills.^{25,28,29} Tools distributed to the nursing units after the workshop also included some of those most highly-recommended in the literature: i.e., mnemonic pocket cards, and study packets for independent learning and reinforcement of skills.^{28,29} This workshop targeted barriers identified in the literature; namely lack of knowledge and skills for accessing, assessing, interpreting, and applying best.^{11,42} Content was organized and presented based on the 5 A's: Ask, Access, Appraise, Apply and Alert peers.^{25,42}

Several months after the initial workshop was conducted, the study staff recognized that unit mentors required not only continued mentoring and practical support, but further didactic education. Therefore, following the transition to joint facilities, several four-hour refresher workshops were conducted for the unit-level mentors, along with periodic individualized mentorship sessions conducted by the study team. The workshop leaders reviewed previous content, targeted barriers that had been identified after the transition, and coached how to assess and apply best evidence in the new environments.

In addition to establishing and empowering trained unit-level mentors, the study staff also implemented librarian support to conduct online literature searches and retrieve journal articles and other forms of evidence; distributed lanyard hang-tag style pocket cards and EBP textbooks to each unit; provided access to individual self-paced training modules; and supervised study team EBP projects.

To serve as easy and quick references to principles of EBP, pocket cards with the mnemonic CHANGE on one side were produced and provided to workshop participants. *CHANGE* stands for Challenge current practice, Hunt for evidence in the literature, Appraise the evidence, Negotiate a plan for improvement, Gauge success, Establish policies for improved

practice.²⁸ The reverse side outlined *How to CHANGE Practice* by using EBP, and following the “5 As” (Ask, Access, Appraise, Apply, and Alert peers).^{25,42} To further support EBP learning activities, a self-instruction module was developed from workshop slides; and educational materials presented at the EBP workshops were made available online, in shared network folders.

Instruments

Four instruments were used to evaluate the study intervention: Organizational Readiness for System-wide Integration of Evidence-based Practice (ORSIEP); EBP Beliefs (EBPB); and EBP Implementation (EBPI) scales; and an investigator-developed demographic instrument.⁴³ Although three instruments (ORSIEP, EBPB, and EBPI) had been previously validated, this investigation provided their first testing at a military medical facility.⁴³ Face validity for use in a military setting was reviewed by the instruments’ original authors and the study team members, and was found to be appropriate for use in this population.

Organizational Readiness for System-wide Integration of Evidence-based Practice (ORSIEP)

The ORSIEP was used to measure organizational readiness for and barriers to integration of EBP. This 25-item survey uses a 1-5 Likert scale ranging from 1, *not at all* to 5, *very much*. Examples include “to what extent is EBP clearly described as central to the mission and philosophy of your institution?” and “To what extent are the nurses with whom you work committed to EBP?” Three items are measured by percent quartiles from *none*, 25%, 50%, 75%, to 100%, and measure the extent of decisions that are generated from “direct care providers, upper administrators, or physician and other health care groups.” One item measures perception of overall readiness of the institution for EBP by “*not ready*,” to “*past ready and onto action*.” The last item on this instrument measures respondents’ assessment of “compared to 6 months ago how much improvement in your organization has there been toward an EBP culture?” on a 5-point

Likert scale ranging from *none* to a *great deal*. Individual scores were summed to obtain total scores.

EBP Beliefs (EBPB)

The EBPB scale measured EBP beliefs and values. Its 16 items are measured with a 5-point Likert scale ranging from 1 *strongly disagree* to 5 *strongly agree*. Items on this instrument include belief and confidence statements such as “I believe I can overcome barriers in implementing EBP” and “I am sure that I can access the best resources in order to implement EBP.” The individual item scores were summed for a total score.

EBP Implementation (EBPI)

The EBPI instrument was used to measure level of EBP implementation. It has 18 items in the form of statements that measure frequency of EBP activities. Respondents were asked to quantify the number of times in the past 8 weeks they had performed EBP activities, using such statements as “I used evidence to change my clinical practice,” or “I promoted the use of EBP to my colleagues.” Data were measured on an ordinal scale from 0-4 with zero indicating zero times, 1 being from 1-3 times, 2 from 4-5 times, 3 from 6-7 times, and four indicating ≥ 8 times. These item scores were summed for a total score.

Demographics

A single page of demographic questions captured the following information: age, gender, military rank, and number of years since basic nursing school graduation. In order to match pre- and post-intervention data while maintaining anonymity, respondents were asked to provide the last four digits of their cell phone numbers and the year of their birth.

Data Collection and Analysis

Paper surveys were distributed at baseline (prior to any intervention), and 18 months post-intervention. Respondents took approximately 15 minutes to complete and deposit the surveys into locked, labelled survey collection boxes anchored at each unit’s nurses’ station. Respondents

were asked to use their year of birth and last 4 digits of their cell phone number as their code, so that pre-intervention surveys could be matched to post-intervention surveys. To capture data from nurses who might have been away or may not have received the first survey a second survey distribution was conducted at two weeks for both the pre- and post-intervention surveys. Surveys and demographic pages were scanned into a database using Teleform® software and hardware.

Data were analyzed using IBM SPSS for Windows (version 22). Frequencies were obtained and examined for all variables. Descriptive statistics were calculated for both quantitative and categorical variables. The individual overall scores were computed for the ORSIEP, EBPB, and EBPI instruments. The dependent or paired samples t-test was performed to evaluate the differences between and pre- and post-intervention in the matched, individual level data (N=56). Because the matched sample size was relatively small, the total organizational sample was also analyzed separately, using independent samples t-tests.

RESULTS

The baseline survey response rate was 38% (360/941); the post-intervention survey response rate was 31% (325/1053). Because of incomplete and/or missing fields, 6 post-intervention surveys were removed from the analyses.

The demographics of both the individual/ matched pair sample and the organizational sample are depicted in Table 1. The 56 who completed both the pre-test and the post-test were slightly older than the organizational sample, but had comparable years worked in nursing. The matched pair sample also had a higher percentage of female nurses as compared to the larger, organizational sample. Both samples had a high proportion of BSN-prepared nurses.

Table 2 compares the pre-test and post-test scores of the matched individual sample. All scores improved over time. The ORSIEP and EBPB scores showed statistically significant improvements ($p \leq .05$), but the EBPI scores did not. In the organizational sample, there was also

improvement in the scores from pre-test to post-test; however, only the ORSIEP scale demonstrated a statistically significant improvement ($p \leq .05$).

DISCUSSION

The primary purpose of this study was to test the effectiveness of a dynamic EBP educational and mentoring program facilitated by unit-level mentors to promote and sustain EBP culture as prescribed by the ARCC Model. The main findings, that the scores of all three scales improved, imply project success. That two of the three scales reached statistical significance in a relatively small sample of matched pre- and post-tests is even more striking. It is clear from both samples that organizational readiness for EBP significantly improved following the intervention.

Although two thirds of the Army nursing staff relocated and integrated into a Navy-led facility, the organizational readiness scale demonstrated unexpected significant and positive change from pre- to post-intervention among all respondents. Most nurses reported their belief that EBP is central to the organization mission and philosophy, and that EBP was practiced in their organization before, and even more so following the facility integration. Respondents also frequently identified Nurse Educators and Advanced Practice Nurses as mentors who facilitate or support EBP. Consistent with previous studies, and not found to be significant in this study, the implementation scale results demonstrated that nurses rarely used, discussed, shared evidence, or changed their practice based on evidence. Although not significant in terms of belief, nurses consistently reported that EBP could improve clinical care that apprising evidence was important, and implementation of EBP would improve patient care.

For this study, the four core ARCC constructs were used: First an organizational assessment of culture and readiness was instigated; second, the study team reviewed survey data to identify facilitators and barriers; third, a cadre of unit-level mentors was selected (with support from organizational leaders) for education and sustainment; and fourth, the program was

implemented. There are three important implications for policy and practice from this study: identifying and overcoming barriers is essential; and with this continued support for EBP, cultural changes are possible even during a chaotic time such as system transformation.

At every opportunity the study staff worked to integrate methods to barriers and provide facilitators to EBP. For example, as an initial part of the interventional program and as a baseline of education to ensure that all were starting with the same information, a two day conference was held. The workshop content included interactive discussion regarding the best recognized barriers to implementation and integration of EBP at bedside: absence of skill sets for asking questions; deficiency in accessing, searching, appraising, and incorporating evidence into decision-making; and workplace culture itself, which may represent a powerful barrier to the use of evidence in practice.¹¹ Workshop leaders also emphasized that participants critically appraise the presence (or absence) in their units of systematic ways to promote clinical scholarship, lack of systemic supports to implement changes, and lack of perceived value for research and.^{9,11,24,25}

Study Limitations

The main limitation of this study was the ongoing and unmeasured change during the study period. Change was evident in the turnover of staff due to military moves and mission requirements; however, more striking was the change experienced by merging two very distinct military cultures into a single setting. There was no way to capture whether this itself affected the study response rates or the responses themselves.

Another limitation was the small sample of matched pairs. In order to use a coding system that would be unique, unidentifiable, unchanging, and easily remembered pre- to post, respondents were asked to provide the last four digits of their cell phone numbers combined with their birth year. Many of these codes were missing or incomplete on the post-implementation surveys, limiting the ability to match participants (matched n=56). However, with all the

turbulence of the facility merger, it is possible that some of the nurses who completed the pre-test were no longer at the facility and thus, could not have completed a post-intervention survey.

Additionally, it would be interesting in retrospect to measure which interventions and other factors, particularly those associated with the facility restructuring, influenced the organizational readiness, nursing beliefs, and implementation of EBP among the nurses. Future effort may include measurement of influence by mentorship by the newly established Doctor of Nursing Practice clinicians in the military healthcare setting, with more concentrated training and focus on EBP programs.

CONCLUSION

The results of this study indicate that despite high turnover rates and redistribution of nursing personnel among transformed medical facilities, mean rates of commitment to essential tenets of EBP were moderately strong, are positively influenced by mentors' interventions, and remain moderately strong even after structural and subsequent team re-disruptions. Further studies among military nurses, using the same intervention and instruments, may show that commonly perceived systemic organizational barriers do not adversely affect – and may even raise – commitments to EBP organizational culture, readiness, beliefs, and implementation. Indeed this study does suggest that commitment to an EBP culture starts within individuals and spreads throughout an organization one individual at a time.

The skills necessary to find, evaluate, incorporate, and apply evidence at the point of care are imperative for all health care professional staff. These abilities transcend military nursing, extending to the larger medical community. In order to accomplish well-established and widely-held goals regarding achieving and sustaining best practices in contemporary health care, the processes and skills involved in evidence-seeking and application must be ingrained as second nature in providers. Conditions, locations of practice, resources available, and composition of care teams may change, but the process and skills involved in seeking and applying evidence must

become enculturated. Nursing must grow and develop in a creative learning environment, with a culture of innovation, evidence-seeking, and inquiry. The use of evidence at the point of care to use best solutions to tackle patient care problems will surely raise the level of healthcare quality in the 21st century.

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References

1. Institute of Medicine. (IOM). *To err is human: Building a better health system*. Washington, DC: National Academies Press; 2000.
2. Institute of Medicine. (IOM). *Crossing the Quality Chasm: A new Health system for the 21st Century*. Washington, DC: National Academies Press; 2001.
3. Ferguson TB. The Institute of Medicine Committee Report “Best Care at Lower Cost: The Path to Continuously Learning Health Care.” *Circ Cardiovasc Qual Outcomes*. 2012;5(6), e93-e94. Accessed at <http://circoutcomes.ahajournals.org> doi: 10.1161/CIRCOUTCOMES.112.968768
4. Maljanian R, Caramanica L, Taylor SK, MacRae JB, Beland DK. Evidence-based nursing practice, Part 2: building skills through research roundtables. *J Nurs Admin*. 2002;32(2):85-90.
5. Newhouse RP, Johnson K. A case study in evaluating infrastructure for EBP and selecting a model. *J Nurs Admin*. 2009;39(10):409-411. doi: 10.1111/j.1741-6787.2007.00075.x
6. Sackett DL, Rosenberg W, Gray JA, Haynes RB, Richardson WS. Evidence based medicine: What it is and what it isn't. *BMJ*. 1996;312(7023):71-72.doi: <http://dx.doi.org/10.1136/bmj.312.7023.71>
7. Melnyk, BM, Fineout-Overholt E. Consumer preferences and values as an integral key to evidence-based practice. *Nurs Admin Q*. 2006;30(2):123-127.
8. Newhouse RP. Creating infrastructure supportive of evidence-based nursing practice: leadership strategies. *Worldviews on Evidence-Based Nursing*. 2007a;4(1):21-29. doi: 10.1111/j.1741-6787.2007.00075.x
9. Melnyk BM., Fineout-Overholt E, Stillwell SB, Williamson KM. Evidence-based practice: step by step: igniting a spirit of inquiry. *Am J Nurs*. 2009;109(11):49-52. doi: 10.1097/01.NAJ.0000363354.53883.58
10. Newhouse R, Dearholt S, Poe S, Pugh LC, White KM. Evidence-based practice: a practical approach to implementation. *J Nurs Admin*. 2005;35(1):35-40.
11. Salmond SW. Advancing evidence-based practice: a primer. *Orthop Nurs*. 2007;26(2):114-125. doi: 10.1097/01.NOR.0000265869.72265.0a
12. Solomons NM, Spross JA. Evidence-based practice barriers and facilitators from a continuous quality improvement perspective: an integrative review. *J Nurs Manag*. 2011;19:109–120. doi: 10.1111/j.1365-2834.2010.01144.x
13. Yoder LH, Kirkley D, McFall DC, Kirksey KM, StalBaum AL, Sellers D. Staff nurses' use of research to facilitate evidence-based practice. *Am J Nurs*, 2014; 114(9), 26-37.doi: 10.1097/01.NAJ.0000453753.00894.29.
14. Makic MBF, Rauen C, Watson R, Poteet AW. Examining the evidence to guide practice: challenging practice habits. *Crit Care Nurse*. 2014;34(2):28. doi: 10.4037/ccn2014262
15. Beyea SC, Nicoll LH. Research-based practice provides the foundation for perioperative nursing's preferred future. *AORN*. 1997;65(1):118-119.
16. Fineout-Overholt E, Melnyk BM, Schultz A. Transforming health care from the inside out: advancing evidence-based practice in the 21st century. *J Prof Nurs*. 2005; 21(6):335-344. doi:10.1016/j.profnurs.2005.10.005

17. Melnyk BM, Fineout-Overholt E, Gallagher-Ford L, Kaplan L. The state of evidence-based practice in US nurses: critical implications for nurse leaders and educators. *J Nurs Admin.* 2012;42(9):410-417. doi: 10.1097/NNA.0b013e3182664e0a
18. Brown CE, Wickline MA, Ecoff L, Glaser D. Nursing practice, knowledge, attitudes and perceived barriers to evidence-based practice at an academic medical center, *J Adv Nurs.* 2008; 65(2):371–381. doi: 10.1111/j.1365-2648.2008.04878.x
19. Shin J, Haynes R, Johnston M. The effect of problem based, self-directed undergraduate education on life-long learning. *Can Med Assoc J.* 1993;148:969-976. Accessed at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1490700/pdf/cmaj00307-0119.pdf>
20. Estabrooks CA. Will evidence-based nursing practice make practice perfect? *Can J Nurs Res.* 1998;30(1):15-36. Accessed at http://digital.library.mcgill.ca/cjnr/pdfs/CJNR_Vol_30_Issue_01_Art_01.pdf
21. Pravikoff DS, Tanner AB, Pierce ST. Readiness of US nurses for evidence-based practice: many don't understand or value research and have had little or no training to help them find evidence on which to base their practice. *Am J Nurs.* 2005;105(9):40-51.
22. Institute of Medicine (IOM). *Best Care at a Lower Cost: The Path to Continuously Learning Health Care in America.* Washington, DC: National Academies Press; 2012.
23. Estabrooks CA, Floyd JA, Scott-Findlay S, O'Leary KA, Gushta M. Individual determinants of research utilization: a systematic review. *J Adv Nurs.* 2003;43(5):506-520. doi: 10.1046/j.1365-2648.2003.02748.x
24. Mohide EA, Coker E. Toward clinical scholarship: promoting evidence-based practice in the clinical setting. *J Prof Nurs.* 2005; 21(6):372-379. doi:10.1016/j.profnurs.2005.10.003
25. Sanares DC, Waters PJ, Marshall DR. Mainstreaming evidence-based nursing practice. *Nurse Leader.* 2007;5(3):44-49. doi:10.1016/j.mnl.2007.03.010
26. Bevan NA, Pelosi-Kelly JM. Nursing research: building interest and keeping it alive helping hospital nurses implement evidence-based practice. *Am J Nurs.* 2006;106(10):72a-72d.
27. Melnyk BM. The evidence-based practice mentor: a promising strategy for implementing and sustaining EBP in healthcare systems. *Worldviews on Evidence-Based Nursing,* 2007;4(3):123-125. doi: 10.1111/j.1741-6787.2007.00094.x
28. Pagani C, Jacalan-Baras J. PERL of wisdom: a tool to help bedside nurses remember available Evidence-Based resources. *Creat Nurs.* 2009;15(2):85-89. doi: <http://dx.doi.org/10.1891/1078-4535.15.2.85>
29. Pierson MA, Schuelke SA. Strengthening the use of evidence-based practice: development of an independent study packet. *J Cont Educ Nurs.* 2009; 40(4):171-176. doi: <http://dx.doi.org/10.3928/00220124-20090401-09>
30. Nightingale F. *Notes on Nursing: What Nursing Is, What Nursing is Not.* Philadelphia, London, Montreal: J.B. Lippincott Co; 1946 reprint (First published London, 1859: Harrison & Sons).
31. Cochrane AL. *Effectiveness and Efficiency: Random Reflections on Health Services.* London: Nuffield Provincial Hospitals Trust; 1972. (Reprinted in 1989 in association with the BMJ, Reprinted in 1999 for Nuffield Trust by the Royal Society of Medicine Press, London (ISBN 1-85315-394-X).)
32. Felton G, McCorkle MR, Redman B. The coming of age of military nursing research, *J Prof Nurs.* 1998;14(2):85-91. doi:10.1016/S8755-7223(98)80035-5

33. Leifer SL, Glass LK. Planning for mass disaster in the 1950's: Harriet H. Werley and nursing research. *Nurs Res*. 2008;57(4):237-244. doi: 10.1097/01.NNR.0000313491.94906.8e
34. Kenny DJ, Richard ML, Cenicerros X, Blaize K. Collaborating across services to advance evidence-based nursing practice. *Nurs Res*. 2010;59(1):S11-S21. doi: 10.1097/NNR.0b013e3181c3c011
35. Estabrooks CA, Kenny DJ, Adewale AJ, Ciummings GG, Mallidou AA. A comparison of research utilization among nurses working in Canadian civilian and United States Army healthcare settings. *Res Nurs Health*. 2007;30(3):282-96. doi: 10.1002/nur.20218
36. Author XX, Shang J, Lake ET. Organizational determinants of quality care and nurse job outcomes among Army Medical Department registered nurses. *Res Nurs Health*, 2010; 33(2), 99-110. doi: 10.1002/nur.20370
37. Author XX, Freeman J. Author XX, McCarthy M, Belew D, Author XX. (in review). A nursing care redesign framework for system-wide improvement: the Patient CaringTouch System. *J Nurs Admin*.
38. Jennings BM, Author XX. Misconceptions among nurses about evidence-based practice. *Journal of Nursing Scholarship*. 2001;33(2):121-127. doi: 10.1111/j.1547-5069.2001.00121.x
39. Patelarou AE, Patelarou E, Brokalaki H, Dafermos V, Thiel L, Melas CD, Koukia E. Current Evidence on the Attitudes, Knowledge and Perceptions of Nurses Regarding Evidence-Based Practice Implementation in European Community Settings: A Systematic Review. *J Community Health Nurs*. 2013; 30(4):230-244. doi:10.1080/07370016.2013.838501
40. Melnyk BM, Fineout-Overholt E. Putting research into practice. *Reflections on Nursing Leadership/Sigma Theta Tau International, Honor Society of Nursing*. 2002;28(2):22-5.
41. Department of Defense (DOD). *Department of Defense Base Closure and Realignment Report Volume 1; Part 2 of 2: detailed recommendations May 2005*. Washington, DC: Base Realignment and Closure Committee, US Dept of Defense; 2005. Accessed at <http://www.brac.gov/docs/final/Volume1BRACReport.pdf>
<http://www.brac.gov/docs/final/Volume2BRACReport.pdf>
42. Balakas K, Potter P, Pratt E, Rea G, Williams J. Evidence equals excellence: The application of an evidence-based practice model in an academic medical center. *Nurs Clin North Am*. 2009;44(1):1-10. doi:10.1016/j.cnur.2008.10.001
43. Melnyk BM, Fineout-Overholt E, Mays MZ. The evidence-based practice beliefs and implementation scales: psychometric properties of two new instruments. *Worldviews on Evidence-Based Nursing*. 2008;5(4):208-216. doi: 10.1111/j.1741-6787.2008.00126.x
44. Melnyk BM, Fineout-Overholt E, Giggelman, MA, Cruz, R. Correlates among cognitive beliefs, EBP implementation, organizational culture, cohesion and job satisfaction in evidence-based practice mentors from a community hospital system. *Nurs Outlook*. 2010;58:301-308. doi:10.1016/j.outlook.2010.06.002

	Individual Sample			Organization Sample					
	N	Mean	SD	Pre-test			Post-test		
Quantitative Variables				N	Mean	SD	N	Mean	SD
Age (Years)	56	38.48	11.33	302	37.86	11.53	352	35.86	11.12
Years in nursing	56	10.64	11.35	308	10.72	10.7	357	9.62	10.1
Categorical Variables	N	%		N	%		N	%	
Gender									
Male	9	16.1		92	28.8		103	28.6	
Female	46	82.1		221	69.3		255	70.8	
Nurse Type									
RN	51	98.2		283	88.7		305	84.7	
LPN/Nursing Assistant	5	1.8		31	9.8		54	15	
Highest Degree									
Diploma/Associate	14	25		62	0.20		77	0.22	
Baccalaureate	39	69.6		220	0.72		245	0.70	
Masters/PhD	2	3.6		24	0.08		28	0.08	

Table 1. Demographics

Individual level scores (N =56 matched pairs)							
Scale	Pre-test		Post-test		t	df	p
	M	SD	M	SD			
ORSIEP	53.53	18.23	59.3	16.5	-1.96	55	0.05
EBPB	55.12	12.79	59.05	7.98	-2.38	55	0.02
EBPI	12.46	10.98	14.67	12.7	-1.11	55	0.27
Organizational level scores (N = 238 – 347)							
Scale	Pre-test		Post-test		t	df	p
	M	SD	M	SD			
ORSIEP	70.96	19.9	77.63	18.56	-3.95	520	<0.01
EBPB	41.12	8.3	42.19	8.7	-1.59	644	0.11
EBPI	15.69	14.29	17.37	16.05	-1.36	617	0.17

Table 2. EBP Readiness, Beliefs, and Implementation Scale Scores.